

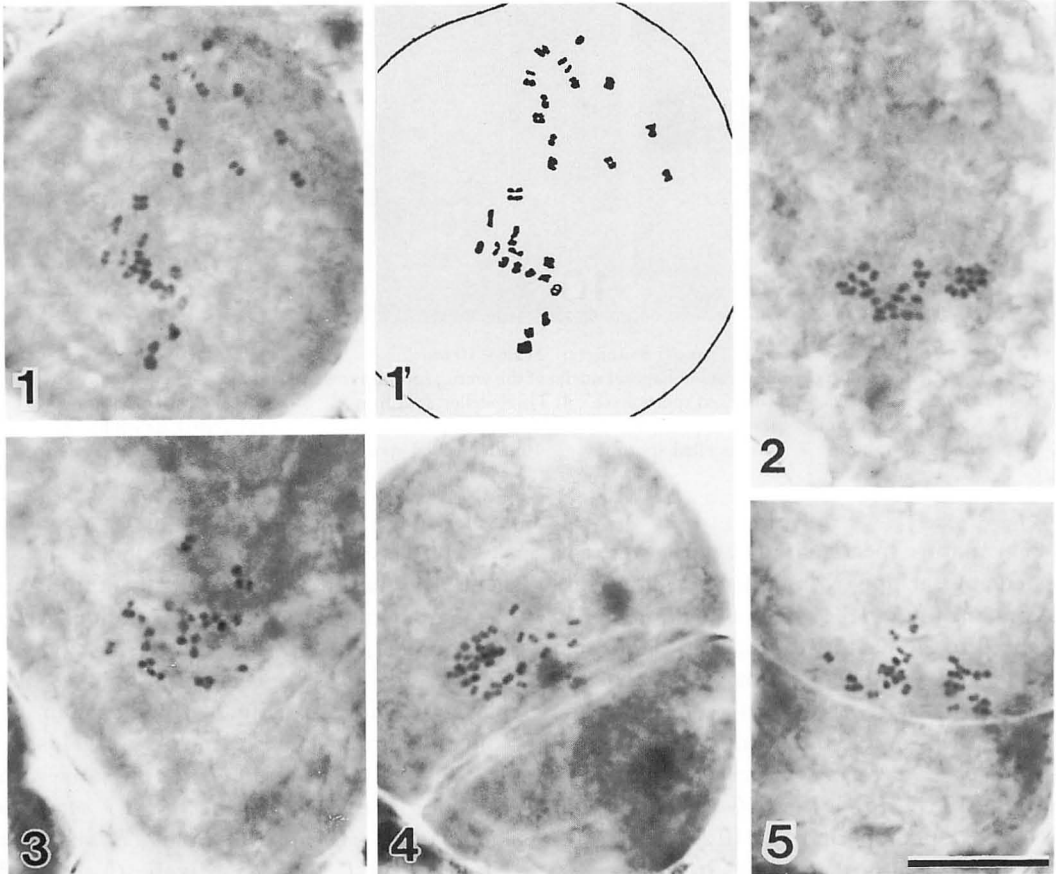
## Hajime Yasui: Karyological observation in the young sporophytes of *Costaria costata* (Turner) Saunders (Laminariales, Phaeophyta)

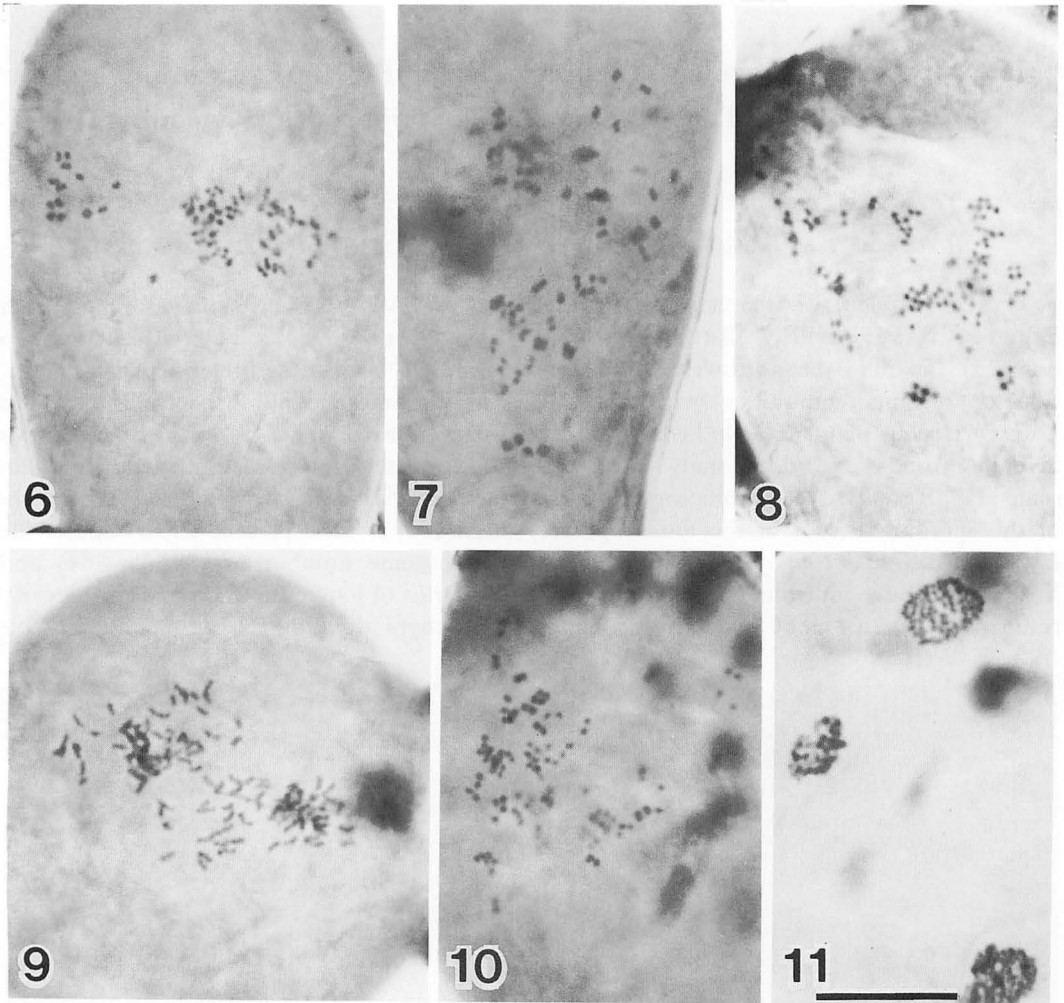
*Key Index Words:* chromosome number—*Costaria costata*—haploid—Laminariales—parthenogenesis—Phaeophyta.

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The brown alga, *Costaria costata* (Turner) Saunders is very widely distributed from northern Japan to the northwestern Pacific coasts, forming communities with several Laminariaceae plants on kelp beds, and the juvenile fronds are occasionally used as seafoods. Recently, the chromosome counts in the sporophyte cells of the four popular *Laminaria* species from Japan (Yabu and Yasui 1991) were indicated to have different results ( $n=32$ ,  $2n=ca.60$ ) from the previous

reports (Abe 1939, Nishibayashi and Inoh 1956, Kaneko 1972, Yabu 1973, Funano 1983, etc.) as  $n=22$  in their zoosporangium. The chromosome number of this alga has been recorded to be  $n=ca.30$  at diakinesis stage in the zoosporangium with paraffin method (Nishibayashi and Inoh 1957, Ohmori 1967). The present paper reports the chromosome number ( $n=32$ ,  $2n=64$ ) and the ratios of haploid and diploid in the early sporophytic dividing cells of this alga in cul-





Figs. 1-11. *Costaria costata* (Turner) Saunders. Scale = 10  $\mu$ m.  
 Figs. 1-5. Metaphase chromosomes of haploid nuclei of the young sporophytes. 1 and 2. One-celled sporophyte. 1'. Illustration in Fig. 1. 3. Two-celled sporophyte. 4. Three-celled sporophyte. 5. Four-celled sporophyte. Figs. 6-11. Metaphase chromosomes of diploid nuclei of young sporophytes. 6 and 7. One-celled sporophytes. 8. Two-celled sporophyte. 9. Three-celled sporophyte. 10. Five-celled sporophyte. 11. Nine-celled sporophyte.

ture.

The mature specimens of *C. costata* were collected at Osatsube, Minamikayabe-cho, Hokkaido on July 11, 1990, were immediately brought to the Faculty of Fisheries, Hokkaido University. In the laboratory, liberated zoospores from those fronds were cultured in the filtered seawater containing 0.01% SLP (Squid Liver Protein Powder) extract (Yabu *et al.* 1984) under 3000-3500 lux with 12L : 12D photoperiod, at  $10 \pm 1^\circ\text{C}$ . After 18-22 days culture, the one- to eight-celled

sporophytes were fixed at 5-6 hours from the start of dark-period by ethyl alcohol 3: acetic acid 1 solution, stained with aceto-iron-haematoxylin-chloral hydrate solution (Wittmann 1965).

The one- to three-celled sporophytes displayed to have exactly 32 (haploid) or 64 (diploid) chromosomes at metaphase (Figs. 1-4, Figs. 6-9.). The number was the same with the four species of *Laminaria*, *L. angustata* Kjellman, *L. japonica* Areschoug, *L. ochotensis* Miyabe and *L. religiosa* Miyabe (Yabu and

Table 1. Number of haploid or diploid sporophytes of *Costaria costata* (Turner) Saunders obtained from chromosome count in the dividing cells.

Nuclear phase	1-celled stage	2-celled stage	3-celled stage	4-celled stage	5-celled stage
Haploid	67	22	8	2	1
Diploid	28	39	35	37	27

Yasui 1991). The ratio (haploid : diploid) of the one-celled sporophytes showed to be approximately 70% : 30%, however, the percentage of haploid was rapidly decreasing as the germination developed, became 2-4% in the four- or five-celled stage (Figs. 5 and 10, Table 1). Although it is difficult to count the chromosome number of the more developed sporophytes than nine- or ten-celled stage (Fig. 11), the rare occurrence for parthenogenetic sporophytes of *C. costata* was suggested by the above results. In size, the haploid sporophytes (Figs. 1-3) were nearly same with the diploid (Figs. 6-8), both sporophytes (width: 27-35  $\mu\text{m}$ , length: 35-45  $\mu\text{m}$ ) at one- or two-celled stage were larger than those (width: 20-25  $\mu\text{m}$ , length: 24-31  $\mu\text{m}$ ) of the other Japanese Laminariaceae plants (Yabu *et al.* 1985, Yabu and Yasui 1991).

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## 安井 肇：スジメの初期胞子体に於ける核学的観察

褐藻コンブ目植物スジメ *Costaria costata* (Turner) Saunders の成熟藻体より得た遊走子を培養して雌性配偶体上に形成される 1-数細胞期の芽胞体について核分裂を調べたところ  $n=32$  または  $2n=64$  の染色体数を有する 2 種類の個体が観察された。これらの芽胞体に於ける単相体の割合は 1 細胞期で約 70% に達していたが、その後減少し、2 細胞期で約 36%、4-5 細胞期には数% 以下となった。1-2 細胞期での単相体と複相体の大きさはほぼ同じであったが、何れも他の邦産コンブ科のものより幾分高い値を示した。本種では、少なくとも初期発生の段階で正常 2 倍体と単為発生体が混在しているものと推察された。(041 函館市港町 3-1-1 北海道大学水産学部)

